EVALUATION OF WATER HYACINTH *(EICHHORNIA CRASSIPES)* AS FEED INGREDIENT AND YOLK COLOURING AGENT IN LAYERS DIETS.

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ABSTRACT

Sixty-four Black Harco breed of laying hens, 39 weeks in lay were fed water hyacinth *Eichhornia crassipes* at dietary levels of 0, 5, 10 and 15% for 56 days. The experiment had eight birds in each of the 2 replicates per treatment with the *E. crassipes* levels of inclusion as treatments. Parameters studied included body weight change, feed intake, egg weight, egg yolk colouration, egg shell thickness and feed conversion ratio (Feed/kg egg). The mean feed intake significantly decreased ($P<0.05$) among the mean values of 126.98, 127.29, 127.27, and 122.59 g/day for 0, 5, 10 and 15% inclusion levels respectively. The egg shell thickness increased significantly ($P<0.05$) among the mean values obtained i.e from 0.51-0.67 mm. However, egg weight changes, egg yolk colouration and feed conversion ration did not show any significant difference ($P>0.05$) among the respective means. *E. crassipes* appears to be optimally utilized at 5% dietary level in layers ration and could be used as pigmenter for egg yolk colouration at this level.

Key words: Water hyacinth, feed ingredient, yolk colouring agent, old layer.

INTRODUCTION

Water hyacinth *(Eichhornia crassipes)*, an aquatic weed of high propagative proliferation invade the coastal shores, lagoons and creeks of Nigeria in 1985. It has consitituted a menace to the immediate community of the infested areas. It affects navigation, fishing and other economic activities on the lagoons and creeks as a result of its high growth or reproduction rate put at between 3-6 daughter plant per week (Ottmar, *et al,* 1983) in the Sudan.

Earlier study on the utilization of water hyacinth by poultry revealed poor response when fed as a fodder, apparently due to its low dry matter and the corresponding low energy contents (Ottmar *et al.,* 1983). However, the feasibility of its use as a natural sourse of pigmenters for egg yolk is of scientific interest. Several workers in the last two decades have reported possible sources of natural pigmenters for egg yolk colouration. Sources such as *Stylosanthes gracilis, red pepper,* tomato pomace, and the leaves of some legumes have been reported (Reddy, 1975; Ogunmodede and Eyo, 1977; Onwudike and Adegbola, 1977; Grandi *et al*, 1978 and Udedibie, 1987) in poultry.

The green colouration of *E. crassipes* and its abundance, motivated this study to ascertain its use as a natural source of pigmenter in layers ration.

MATERIALS AND METHODS

The *E. crassipes* used in this study was collected from one of the creeks in Ikorodu town, Lagos State of Nigeria. The roots and petioles were immediately removed and discarded after running drums filled with water over it to press out water. The leaves were immediately chopped to an average size about 2cm in length, sundried until crispy while still retaining the greenish colouration and then later ground in a plate mill. The green leaf meal obtained was then used in formulating white maize-based layers diet at 0, 5, 10 and 15% levels (Table 1). The green leaf meal sample was also analysed for proximate composition according to A.O.A.C. (1980). The ash was analysed for Ca, K, Na, and Mg. The value of 9.4 MJ/Kg was used as metabolizable energy of water hyacinth (Ottmar *et al,* 1983).

Sixty-four hens of Black Harco breed which were 39 weeks in lay were randomly alloted to the 4 experimental diets. Each treatment was replicated twice with 8 hens per replicate.

TABLE 1: COMPOSITION OF WATER HYACINTH-BASED LAYERS DIETS

Ingredients	%Composition of water hyacinth			
	0	5	10	15
White maize	50.0	45.0	40.0	35.0
Sorghum offals	15.0	15.0	15.0	15.0
Brewers' dried grains	8.0	8.0	8.0	8.0
Water hyacinth	-	5.0	10.0	15.0
Groundnut cake	14.5	14.5	14.5	14.5
Fish meal	3.0	3.0	3.0	3.0
Bone meal	9.0	9.0	9.0	9.0
Salt	0.25	0.25	0.25	0.25
Premix*	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**
Calculated Analysis				
Metabolizable Energy Kcal/kg	2748.0	2688.3	2628.6	2568.9
Crude Protein%	15.98	16.27	16.55	16.84
Crude Fibre%	4.10	4.79	5.49	6.19
Calcium %	3.55	3.56	3.72	3.82
Phosphorus %	1.39	1.43	1.46	1.50

To provide the following per kg: Vit A 8 x 106 I.U.; D3 1/4 X 10^6 I.U; E5X 10^3 I.U; K 2 X 10^3 I.U. Riboflavin 3 x 10^3mg; Pantothenic acid 5 x 10^3mg; Niacin 1.2 x 10^4 mg; Choline Chloride 200g; B_{12} 6g; anti-oxidant 125g; Manganese 80g; Zinc 50g; Iodine 1.2g; Cobalt 0.2g; Copper 2.0g; Iron 25g.

They were housed in battery cages with 2 birds per cell, dewormed and put on an adaptation period of 14 days before the commencement of the experiment that lasted 56 days.

Data were collected on body weight, feed consumption, hen-day egg production, egg weight and feed conversion ratio as feed per kilogram egg produced. All the eggs produced daily were taken to the laboratory and weighed after collection. Samples of eggs (4/replicate) from each replicate were later broken open and the yolk colour intensity determined using the Hoffman La Roche colour fan developed by Vuilleumier (1969). Data collected were subjected to statistical analysis according to Little and Hills (1978).

RESULTS AND DISCUSSION

The proximate composition of the dired sample of *E. crassipes* is presented in Table 2. The chemical analysis indicates that *E. crassipes* on dry matter basis contain 14.74% crude protein, 2.31% fat, 18% crude fibre, 17.53% ash. The results showed a fairly high protein content in *E. crassipes*. Boyd (1968, 1974) reported crude protein values between 12% and 19.8% (DM basis) in *E. crassipes*.

Taylor and Robbin (1968) also reported a relatively good amino acid composition in *E. crassipes*.

The values obtained in this study for proximate composition of *E. crassipes* are similar to those reported by Boyd and Blackburn (1970).

E. crassipes significantly ($P<0.05$) depressed feed intake at 15% dietary level The low feed consumption observed in treatment 4 as compared to others might not be unconnected with the low palatability of *E. crassipes* and the presence of high value of potassium which may be in form of its chloride as reported by Osman *et al* (1975). There were no significant differences ($P>0.05$) among the treatments in weight gain. Body weight gain ranged from 230g at 10% dietary level of *E crassipes* to 380g at 15% dietary level.

There was no significant difference ($P>0.05$) in hen-day egg production among the treatments. It, however, decreased with increase in *E crassipes*. The general low production observed could be linked directly to the age of the laying birds.

The egg shell thickness was significantly ($P<0.05$) enhanced by *E. crassipes* at 10 and 15% dietary levels. It followed an increasing order as the *E. crassipes* inclusion level increased. The high values obtained might not be unconnected with the high mineral levels in *E. crassipes*.

The egg weight, feed conversion ratio and egg yolk score showed no differences ($P>0.05$) among their various means and did

TABLE 2: PROXIMATE COMPOSITION OF WATER HYACINTH ON % DM BASIS

Parameters	Levels
Crude Protein	14.74
Ether extract	2.31
Crude Fibre	18.00
Ash	17.53
Dry matter	6.00
Ca	1.84
K	2.74
Na	0.51
Mg	0.45
M.E. (calculated) Kcal/kg	2238.09

TABLE 3 EFFECT OF WATER HYACINTH ON THE PERFORMANCE OF LAYING HENS

Parameters	% Water Hyacinth				
	0	5	10	15	S.E.M
Average Feed Intake (g/day)	126.98a	127.29a	127.27a	122.56b	0.09
Initial Body weight (kg)	1.73	1.69	1.80	1.75	0.04
Final Body Weight (kg	2.08	1.99	2.03	2.13	0.06
Average Body weight change (g)	350	300	230	380	56.79
% Hen-day egg production	66.18	61.6	55.2	54.12	4.95
Average Egg weight (g)	66.7	65.42	67.12	66.56	1.25
Average Egg Yolk colouration	4.44	4.50	4.19	3.69	0.34
Average Egg shell Thickness (mm)	0.51b	0.56b	0.63a	0.67a	0.03
Feed conversion Ratio (Feed/kg egg)	1.91	1.95	1.91	1.85	0.04

a, b means with different superscipts differ significantly ($P < 0.05$).

not follow a particular trend either. The highest yolk score of 4.50 was recorded at 5% *E. crassipes* inclusion. This, to some extent, agreed with Kiebler, (1981)as reported by Ottmar *et al* (1983) on the improvement in yolk colouration when laying hens were fed *E. crassipes* as fodder. This increase in yolk colouration indicates the presence of carotene in available form to some extent.

The result indicates that the utilization of *E. crassipes* at a dietary level above 5% is of no beneficial effect to the laying hens, apparently because of the low intake at higher dietary levels. This also confirms the report of Smetana (1968) on the relative high level of carotene in *E. crassipes*. However, the beauty of its use as a source of pigmenter cannot be fully appreciated because of the associated factors like high crude fibre, low energy and low palatability that limit its use in poultry rations. Further investigation to ascertain the degree of availabilty of carotene to layers from *E. crassipes* will be of interest.

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